Promoting the Selection of Low-Fat Milk in Elementary School Cafeterias in an Inner-City Latino Community: Evaluation of an Intervention

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ABSTRACT

Objectives. This study examined the effects of a school-based intervention designed to promote the consumption of low-fat white milk at lunchtime in 6 elementary schools in an inner-city, primarily Latino neighborhood.

Methods. A multifaceted intervention based on social marketing techniques was delivered at 3 randomly selected schools. The school was the unit of assignment and analysis; 6902 children were involved in the study. Milk selection and consumption were measured by sampling discarded milk and/or tallying milk carton disappearance at baseline, immediately postintervention, and at 3 to 4 months follow-up.

Results. Immediately postintervention, the mean proportion of sampled milk cartons that contained low-fat milk increased in the intervention schools, from 25% to 57%, but remained constant at 28% in the control schools. Differences between intervention and control schools remained significant at 3 to 4 months follow-up. The intervention was not associated with a decrease in overall milk consumption.

Conclusions. A school-based intervention can lead to significant increases in student consumption of low-fat milk. (*Am J Public Health.* 1998;88:427–433)

Introduction

High consumption of dietary fat and saturated fat is a leading behavioral risk factor for cardiovascular and other chronic diseases.[1] Children and adolescents in the United States obtain 33% to 35% of their calories from fat and 12% to 13% from saturated fat,[2–4] above the levels of 30% and 10%, respectively, recommended by the Year 2000 Health Objectives for the Nation and many expert panels.[5–13] Modifying total fat and saturated fat consumption in childhood is particularly important, because early indicators of atherosclerosis appear in youth[8] and because nutrition habits acquired early in life may persist into adulthood.[11]

Milk and dairy products are important sources of nutrients needed for developing and maintaining teeth, bones, and muscles,[14] but whole milk and whole milk products have been identified as the leading contributors to total fat and saturated fat intake among young children.[15–17] Reduced-fat milk provides protein, calcium, and vitamin amounts equivalent to those provided by whole milk. The National Cholesterol Education Program recommends that children make "more frequent choices of low-fat dairy products including low-fat and nonfat milk. . . . [T]his change alone can go a long way toward reducing [saturated fat] intake without jeopardizing intake of essential elements.[8(p.27)]

In the late 1960s, Americans consumed more than 4 times as much whole milk as reduced-fat milk; by the late 1980s, however, reduced-fat milk predominated.[18] In 1993, reduced fat milk sales represented more than 60% of total US milk sales.[19] Nevertheless, a preference for whole milk remains among some segments of the population. In New York City and 6 neighboring suburban counties, whole milk accounts for nearly two thirds of all milk sold.[20] Whole milk continues to outsell reduced-fat milk in Latino communities.[21-24]

A mid-1980s study of 205 New York City Latino children 4 to 7 years of age revealed that none of the children regularly drank reduced-fat milk. Whole milk was the largest contributor to dietary saturated fat, accounting for 44% of total saturated fat consumption.[15] Based on these observations, we estimated that if these children substituted 1% low-fat milk for whole milk without making other dietary changes, there would be a 25% reduction in calories from saturated fat. This single dietary change would reduce average saturated fat consumption for the sample from 13.3% to within the national target range of under 10%. A more recent study of preschool Latino children sampled from the same area of New York City found that whole milk

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TABLE 1—Characteristics of Student Populations at 6 Study Schools

School	Enrollment, No.	Hispanic, %	African-American, %	Eligible for Free Lunch, %	Limited English Proficiency, %	Reading ≥ Grade Level, %
Control						
School 1	1314	69.7	26.1	96.0	49.2	37.6
School 2	599	92.2	2.4	. . .	. . .	25.4
School 3	927	91.6	2.7	80.1	57.9	30.4
Intervention						
School 4	1304	90.6	5.7	95.0	55.1	37.4
School 5	1424	84.6	11.8	76.9	59.0	28.6
School 6	1334	87.9	7.0	83.5	61.4	38.6

continues to predominate (C. E. Basch, unpublished data, 1996).

We evaluated the effects of a multifaceted school-based nutrition education intervention on lunchtime milk selection and consumption in public elementary schools in a low-income, inner-city, largely Latino community in New York City during the 1993/94 school year. The study's primary hypothesis was that, after the intervention, a significantly greater proportion of students would select 1% low-fat white milk at the 3 intervention schools than at the 3 control schools. Changes in the proportion of students selecting milk or in the amount of milk consumed by students were also assessed to address the concern that campaigns promoting the substitution of low-fat for whole milk might decrease overall milk consumption.

Methods

Setting and Subjects

Milk was the only lunchtime beverage offered in all 6 study schools. Each study school offered 1% low-fat chocolate milk 1 or 2 days a week, but all of our data were collected on days when only whole white milk (8 g of fat per serving) and 1% low-fat white milk (2 g of fat per serving) were offered. All milk was served in 0.5-pint (0.2-L) cartons. Students were not supposed to take more than one milk carton, but they could choose to take no milk.

Whole milk dominated milk sales in the community in which the study schools were located. On average, the community's grocery stores had more than 6 times as much whole milk on their shelves as reduced-fat milk.[25] Characteristics of the 6 study schools are presented in Table 1. In the school year before the study was conducted, these 6 schools ordered, on average, 3 times as much whole white milk as 1% low-fat white milk.

Intervention

The intervention was implemented as part of the Washington Heights–Inwood Healthy Heart Program,[26,27] a community-based cardiovascular disease prevention project managed by Teachers College/Columbia University, the Presbyterian Hospital of the City of New York, and the Columbia University School of Public Health. This program was one of 8 community projects supported through the New York State Healthy Heart Program. The intervention was designed, using the PRECEDE framework,[28] to be highly focused, entertaining, and replicable. It featured a number of techniques used in social marketing campaigns,[29] such as product positioning, celebrity endorsements, facilitation of product trials (taste tests), "teaser" advertising, point-of-purchase advertising, sales promotion incentives (product-related contest with product-related prizes) and products (refrigerator magnets), a slogan, and persuasion through entertainment.

The intervention targeted behavior change related to 1 food item and was based on the belief that dietary change campaigns may be most effective when they target specific foods rather than nutrients or general eating patterns.[30] Messages were primarily positive, although students were also taught about the harmful effects of a high-fat diet and about the high fat content of whole milk. Low-fat milk was positioned as the good-tasting, "cool" choice through activities conducted in a fun, light-hearted environment. The intervention did not promote or discourage consumption of low-fat chocolate milk, since nutritionists are divided over whether it should be served in school cafeterias.[31,32]

To motivate children to try low-fat milk, the intervention featured a charismatic celebrity, "Lowfat Lucy," a Disney-like anthropomorphic cow. In drawings, posters, and personal appearances in a costume, Lucy was at the center of all intervention activities. The intervention began when posters were put up around the school stating that "Lucy is coming" in 2 weeks but without showing exactly who or what Lucy was. Every few days, the posters were updated to say "10 Days!" then "One Week!" "Two Days!" "Tomorrow!" and finally, on the day of low-fat milk education auditorium sessions, "Today!" The auditorium session included information about heart health and the benefits of drinking low-fat milk, interactive games, a dramatic entrance by Lowfat Lucy, and a brief presentation from Lucy.

Students had opportunities to try 1% low-fat white milk after the auditorium session and on another day outside the school exit at dismissal time. Immediately following the auditorium sessions, several 3-dimensional, homemade cutout posters of Lucy holding a 1% low-fat white milk carton and saying "Drink Lowfat Milk . . . It's Delicious" were put up near the milk chests in the cafeteria. Of the 4062 students enrolled in the 3 intervention schools, 1691 (42%) participated in the Lowfat Lucy Puzzle Contest, and 134 won prizes (T-shirts with the slogan "If You're Over Two, Lowfat Milk Is Best for You") presented by Lucy. Students and parents were given easy-to-read flyers about low-fat milk, and a presentation was made at parents' association meetings.

To provide culturally appropriate role models, all educational activities were delivered by Latinos. Demands made on teachers and administrators were kept at a minimum. The intervention activities did not involve any classroom lessons. Ensuring that all students had a choice between whole and low-fat white milk, as mandated by law, was an integral part of the intervention; it was the only part of the intervention

that the control schools received. The delivery of each intervention activity was documented to ensure that each was implemented as designed.

The estimated cost of the intervention was approximately $2.25 per student, about equally divided between personnel and supply costs. Approximately one half of the supply costs involved relatively high-priced incentives (novelty pencils, refrigerator magnets, T-shirts).

Study Design

The 6 study schools varied in the usual proportion of all white milk ordered that was 1% low-fat milk (range = 18% to 34%). In order to minimize baseline differences between intervention and control groups, randomization was performed within pairs of schools ranked by this proportion.

Lunchtime milk selection and consumption were measured by sampling discarded milk cartons for 5 days at baseline and for 5 days postintervention. Milk carton disappearance was also measured for 5 days at baseline and postintervention. At 2 intervention and 2 control schools, we also measured milk carton disappearance for 5 days at 3 to 4 months following the last intervention activity. The 5 days of baseline, postintervention, and follow-up observations occurred over a period of approximately 3 weeks. The last baseline observations were conducted within a few days before the first intervention activity, and the first postintervention observations were conducted within a few days after the last intervention activity. The intervention phase lasted 7 to 10 calendar days. As a result of personnel restrictions, the study was not carried out simultaneously in all 6 schools but, rather, in sequential pairs of one control and one intervention school.

Data Collection

The data collection team consisted of 4 to 6 individuals. Researchers took the tray of every third student in grades 1 through 4 as students passed the central trash disposal lines. Sampled trays were separated by sex and grade level. Researchers were instructed to be as unobtrusive as possible and not to tell children why they were in the cafeteria.

To prevent students from realizing that the trays were collected solely for the milk cartons, milk cartons were removed out of view of the students. Researchers counted the number of trays with no milk cartons, 1 milk carton, and more than 1 milk carton for each grade–sex group. They counted the number of cartons of whole milk and of low-fat milk and noted the number of cartons for each type of milk that were empty and the number that were full.

Milk left in discarded cartons was poured into receptacles marked to allow for measurement of volume in ounces. The volume of discarded milk for each type of milk for each grade–sex group was recorded. Interrater reliability was assessed by having three researchers measure the volume of discarded milk in a sample of 20 cartons with different quantities of milk. Pearson correlations were greater than 0.99 for each of the 3 possible pairings of results. Dividing ounces of milk discarded by number of students taking milk provided an estimate of average waste per student. Our calculations assumed that all milk not discarded was consumed, but some carton sharing and milk spillage were observed at randomly selected tables. A total of 5417 students with milk on their trays were observed over the 60 days of data collection for a period of time lasting, on average, 12 minutes. During this time, researchers observed only 24 incidents of students spilling milk and 20 incidents in which one student gave a milk carton to another student.

At baseline and immediate postintervention, 2 researchers also counted the number of cartons in stock of each type of milk before and immediately after each lunch period. At the 3- to 4- month follow-up, the number of cartons was counted only before the beginning of the first lunch period and after the end of the last lunch period.

The availability and accessibility of both low-fat white milk and whole white milk were checked approximately every 5 minutes at both intervention and control schools. Since increases in the proportion of display space taken up by low-fat milk could affect the perception of social norms, we worked with the cafeteria managers to maintain a constant ratio of whole white to low-fat white milk throughout the baseline and immediate postintervention phases of the study. During the 3- to 4-month follow-up phase, we had no control over the display space and, indeed, could not ensure the accessibility of low-fat milk at all.

Data Analysis

The school was the unit of assignment and analysis. There were 3 schools per group. Data are presented for all students combined and for 4 different subgroups: younger girls (first and second grades), younger boys, older girls (third and fourth grades), and older boys.

We used t tests to examine baseline differences by sex, by age, and by intervention status. The main study outcome was the mean value over 5 days of observation, at each school, of the proportion of all milk cartons discarded that contained low-fat milk. Baseline values for the intervention and control groups were thus the means of three school-specific 5-day means. Mean values over 5 days of observation at each school were also calculated for the proportion of trays sampled that had any milk cartons on them.

The effects of the intervention were assessed with analyses of covariance. Initial differences were controlled by including baseline values as covariates. Analyses were run for all students and for the 4 grade and sex subgroups. Pearson correlations and t tests were used to assess the agreement between the proportion of milk selected that was low-fat white milk as measured by the sampling of discarded cartons and by carton disappearance.

Data were initially transcribed from the various data collection forms into a notebook and then entered from the notebook into computer files. One hundred percent verification procedures were conducted at both of these steps. All data were analyzed with SPSS/PC+.[33]

Results

Baseline Milk Selection and Consumption Habits

At baseline, low-fat milk accounted for an average of 27% of the discarded milk cartons sampled in the 6 study schools (range: 23% to 39%). More girls than boys took low-fat milk (on average, 32% of girls per school vs 22% of boys; $t = -2.48$, $df = 10$, $P = .033$). On average, 30% of younger students took low-fat milk, as compared with 24% of older students ($t = 1.43$, $df = 10$, $P = .183$). Across the 6 schools, an average of 30% of the trays sampled did not have any milk cartons (range: 26% to 37%); there were no statistically significant differences by sex, grade level, or intervention status.

Across the schools, discarded milk cartons sampled had, on average, 4.16 oz (124.8 mL) of milk left inside, corresponding to a waste of 52% of the 8-oz serving. Assuming that all milk that was not discarded was consumed, students drank, on average, 48% of their milk (range = 41% to 54%). On average, across the schools, 21% of the cartons sampled were full (i.e., they had not even been opened). Twenty-three

percent of the cartons per school were discarded empty. Boys consumed more of their milk serving (53%) than girls did (42%) (t = 3.94, df = 10, P = .003). There were no significant differences in consumption rates by type of milk or by grade level.

Effects of the Intervention on Milk Selection and Consumption

Immediately following the intervention, the mean proportion of cartons sampled that contained low-fat milk more than doubled in the intervention schools, from 25% to 57%. In the 3 control schools, the mean proportion of cartons sampled that contained low-fat milk remained constant at 28%.

The analysis of covariance showed that, after control for baseline differences, the intervention was associated with a significant increase in the proportion of cartons that contained low-fat milk (F = 48.02, df = 1, P = .006). Separate analyses of covariance showed the same pattern for boys (F = 77.86, df = 1, P < .001), for girls (F = 50.87, df = 1, P < .001), for younger students (F = 56.53, df = 1, P < .001), and for older students (F = 74.76, df = 1, P < .001).

The analysis of covariance for the entire sample showed a significant interaction between the intervention and grade level; after control for initial differences, the effect of the intervention on milk selection was greater among younger children than it was among older children (F = 6.39, df = 1, P = .039). Among first- and second-grade students in the intervention schools, the proportion of sampled milk cartons that contained low-fat milk increased by 155%, from 27% before the intervention to 69% after the intervention. Among third- and fourth-grade students in the intervention schools, the proportion of sampled milk cartons that contained low-fat milk increased by 96%, from 24% to 47% (Figure 1).

There were no significant differences in the effects of the intervention by sex (F = .235, df = 1, P = .642). The mean proportion of sampled milk cartons taken from intervention school boys that contained low-fat milk increased from an average of 20% before the intervention to 51% after the intervention. Among intervention school girls, it increased from 32% to 64% (Figure 2).

During the postintervention period, the mean proportion of trays without milk decreased slightly in both the intervention (from 32% to 30%) and control (from 29% to 27%) schools. The mean proportions of the milk serving consumed were 51% at baseline and 52% postintervention in the intervention schools and 45% at baseline and 47% postintervention in the control schools.

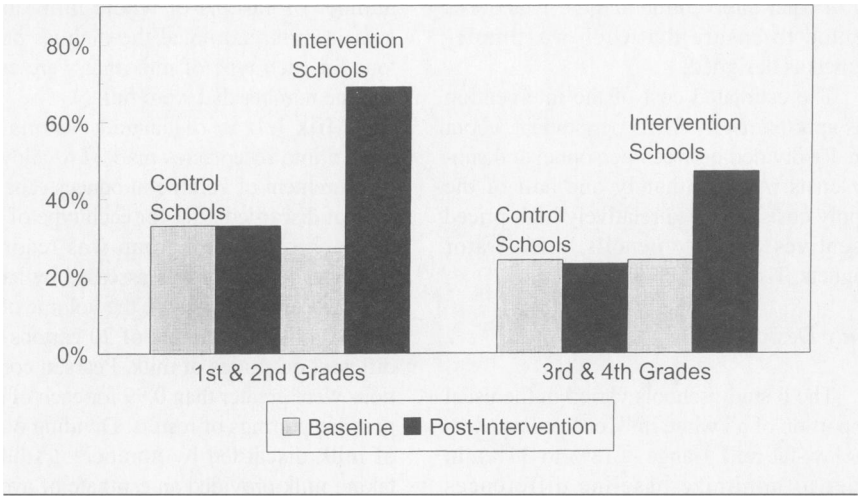

FIGURE 1—Mean proportion of sampled milk cartons containing low-fat milk over 5-day baseline period and 5-day immediate postintervention period, by grade level and treatment condition (n = 6 schools).

An analysis of milk carton disappearance data from 56 study days revealed that the proportion of low-fat milk cartons that disappeared correlated very highly with the proportion of directly observed low-fat milk cartons that were sampled (r = .957, n = 56, P < .001). The means from the disappearance data (32.9%, SD = 17.6%) and from the sampled carton data (33.8%, SD = 19.4%) were not significantly different (t = 1.19, df = 55, P = .237). After control for baseline differences between groups, the intervention was associated with a significant increase in the proportion of disappeared milk that was low fat (F = 48.9, df = 1, P = .006). At the intervention schools, this proportion more than doubled, from a mean of 26% per school at baseline to 58% after the intervention. At the control schools, the proportion of disappeared milk that was low fat increased from 28% per school at baseline to 29% after the intervention.

Disappearance counts at the 3- to 4-month follow-up showed modest declines from immediate postintervention data in the mean proportion of milk that was low fat in both control and intervention schools. The proportions of disappeared milk that was low fat (per school) were 25% at baseline, 58% at postintervention, and 49% at the 3- to 4-month follow-up in the 2 intervention schools studied; in the 2 control schools studied, the proportions were 22% at baseline, 23% at postintervention, and 14% at follow-up. Analysis of covariance data from these 4 schools, controlling for baseline differences, showed that the intervention remained associated with a significant increase at follow-up in the proportion of disappeared milk that was low fat (F = 183.80, df = 1, P = .047).

Discussion

In this study, a school-based intervention led to significant, sustained, positive changes in elementary student milk selection habits in a low-income, largely Latino school district. While only about one fourth of the intervention school students who took milk were choosing low-fat milk at baseline, more than half took low-fat milk following the intervention. This pattern held for all of the grade–sex groups studied. The results are particularly impressive, considering the use of a conservative statistical approach in which the school was the unit of analysis and the sample included only 6 schools.

The success of the intervention might have resulted from the key principles underlying the intervention design: a sharp focus on a specific eating behavior and the use of social marketing techniques. The acceptability and attractiveness of the intervention product was also a factor; when they tried 1% low-fat white milk, the great majority of students said they liked it.

The positive effects of the intervention were generally sustained at least 3 months postintervention. A modest drop in low-fat milk selection at 3 or 4 months follow-up, as opposed to immediately postintervention, was observed in both intervention and control schools. This drop may be explained in part by the fact that, at that

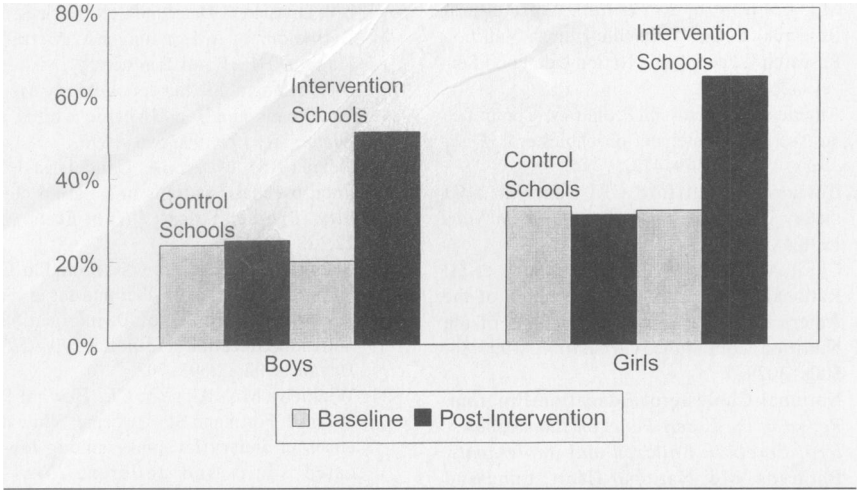

FIGURE 2—Mean proportion of sampled milk cartons containing low-fat milk over 5-day baseline period and 5-day immediate postintervention period, by sex and treatment condition (n = 6 schools).

time, project staff were no longer making sure that there was enough low-fat milk on hand to allow each student a chance to choose it. Project staff had observed that, on some occasions during the immediate postintervention phase, cafeteria staff did not promptly replenish stocks of low-fat milk on the serving line that had been rapidly depleted as a result of the increased demand for low-fat milk. Further research is needed to determine whether the effects of the intervention would last beyond 3 months and, in particular, beyond the summer vacation.

We found 2 studies that reported an increase in student selection of reduced fat or low-fat milk following nutrition education activities. After posters depicting the fat content of different types of milk were displayed in the school cafeteria, the proportion of students taking 2% milk at a junior–senior high school in rural Pennsylvania increased significantly, from 12% to 17%.[34] After a general nutrition education campaign targeting children 11 to 13 years of age in four schools in England, the proportion of students who reported drinking low-fat milk increased significantly, from 40% to 48%.[35]

Although our small sample size (six schools) limited the power of the study to detect differences in milk consumption, the intervention did not reduce the total amount of milk consumed. This study demonstrated that a large number of students who drink whole white milk can be motivated by an educational intervention to switch to low-fat white milk without any apparent effect on the overall rate of milk consumption.

Nearly 1 in 3 children continued to take no milk with their lunch despite the intervention and despite the fact that no beverage other than milk was available to them. Those who took milk cartons wasted an enormous amount of milk, much more than documented in previous studies.[34,36–41] More than 1 in 5 students took a milk carton but did not even open it. Interventions designed to increase the proportion of students taking milk and to reduce milk waste warrant development and testing.

The generalizability of our findings may be limited by differences between New York City and most other areas of the United States in the types of milk offered to and consumed by students in school cafeterias. Schools outside New York City typically offer low-fat chocolate milk more frequently than once or twice a week.[42] A national survey of school lunch program participants found that the most commonly consumed type of milk is 2% milk, which was not offered in the study schools, and that 59% of students who drank milk chose flavored (e.g., chocolate) milk (Pat McKinney, Office of Analysis and Evaluation, Food and Nutrition Service, US Department of Agriculture, written communication, October 1994). Although whole milk is no longer widely consumed in many school districts,[42] the evaluated intervention might be adapted for use by campaigns to promote a switch from 2% milk (which contains 5 g of fat per serving and, as of January 1998, will be sold as "reduced-fat milk") to either 1% low-fat milk or skim milk. The principles and strategies used in the intervention might also be relevant for community-based campaigns that promote low-fat milk consumption or for school- and community-based campaigns that promote other healthy eating behaviors.

Further research is also needed to assess whether the intervention would be effective with students from other ethnic or socioeconomic groups or with older students. Lowfat Lucy, the costumed character at the heart of the intervention activities, definitely held appeal for the young elementary school students in this study, but different types of interventions would probably need to be developed to target students at the intermediate and high school levels.

Feasibility for replication was a key criterion used in the design of this study's intervention components. The intervention requires very little effort from school administrators and teachers and does not interfere with classroom instruction time. Costs could be reduced by obtaining donations for incentive items (e.g., T-shirts, magnets, pencils) and supplies (milk and cookies), by limiting the distribution of incentive items, or by replacing paid staff time with more volunteer time.

Since the study design was not factorial, we cannot say which of the intervention components were responsible for the intervention's success. However, the initial intervention components—teaser posters, auditorium sessions, and cafeteria displays—had a large impact on student milk selection. The proportion of disappeared milk cartons that contained low-fat milk more than doubled at each school on the days immediately following the last auditorium session. The other intervention components—flyers, contest, taste tests, and parent presentation—were designed to reinforce the messages given at the auditorium sessions. We do not know whether the proportion of students selecting low-fat milk would have declined without these activities.

We suspect that the effectiveness of the intervention was limited by our inability to control a key component of marketing strategy: product packaging. The importance of marketing considerations, such as packaging design, in influencing the choices of even very young consumers should not be underestimated. In comparison with boys, a significantly larger proportion of girls took low-fat milk at baseline. In a pilot study at 2 of the study schools, however, boys had been much more likely to take low-fat white milk than girls (38% vs 19%). This shift in low-fat milk popularity from boys to girls was coincident with a shift in the color of the low-fat milk carton from blue during the pilot study to a pinkish color in this study. Merely changing the low-fat

milk carton to a non-gender-specific color might increase the overall proportion of children choosing low-fat milk.

The effect of the intervention on overall fat or caloric intake is not known. By itself, the switch from whole white milk to 1% low-fat white milk would lead to an average approximate reduction of 3 g of fat per day from the half-serving of milk consumed, on average, at lunch (from 4 g of fat in a half-serving of whole white milk to 1 g of fat in a half-serving of 1% low-fat white milk). Students 5 to 11 years of age consume, on average, 89 g of fat daily (Pat McKinney, US Department of Agriculture, oral communication based on unpublished data from the 1992 School Nutrition Dietary Assessment Study, October 1994), so the switch to 1% low-fat milk would have led to a 3.3% reduction in average fat intake. However, it is possible that children might compensate for the switch to low-fat milk by increasing their consumption of dietary fat from other sources.

On the other hand, the nutritional impact of the intervention could be enhanced considerably if it leads to a switch from the consumption of whole to low-fat milk at home and in other school feeding programs (i.e., breakfast, latchkey). Furthermore, by successfully positioning a product whose very name includes the phrase "low fat" as a good-tasting, socially acceptable choice, the intervention may help children to associate positive feelings with other low-fat food products and with the general concept of a diet low in fat. □

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References

1. US Public Health Service. *The Surgeon General's Report on Nutrition and Health*. Washington, DC: US Dept of Health and Human Services; 1988. DHHS publication PHS 88-50211.
2. Devaney BL, Gordon AR, Burghardt JA. Dietary intakes of students. *Am J Clin Nutr*. 1995;61(suppl 1):205S–212S.
3. McDowell MA, Briefel RR, Alaimo K, et al. Energy and macronutrient intakes of persons ages 2 months and over in the United States: third National Health and Nutrition Examination Survey, phase 1, 1988–91. *Adv Data Vital Health Stat.* October 24, 1994; no. 255. DHHS publication PHS 95-1250.
4. Tippett KS, Mickle SJ, Goldman JD, et al. *Food and Nutrient Intakes by Individuals in the United States, 1 Day, 1989–91*. Beltsville, Md: US Dept of Agriculture, Agricultural Research Service, Beltsville Human Nutrition Research Center; 1995. Nationwide Food Surveys report 91–2.
5. American Academy of Pediatrics, Committee on Nutrition. Statement on cholesterol. *Pediatrics*. 1992;90:469–473.
6. Butrum RR, Clifford CK, Lanza E. NCI dietary guidelines: rationale. *Am J Clin Nutr*. 1988;48:888–895.
7. Chait A, Brunzell JD, Denke MA, et al. Rationale of the diet-heart statement of the American Heart Association: report of the Nutrition Committee. *Circulation*. 1993;88: 3008–3029.
8. National Cholesterol Education Program. *Report of the Expert Panel on Blood Cholesterol Levels in Children and Adolescents*. Bethesda, Md: National Heart, Lung and Blood Institute; 1991. NIH publication 91-2732.
9. National Institutes of Health Consensus Development Panel. Lowering blood cholesterol to prevent heart disease. *JAMA*. 1985;253:2080–2086.
10. National Research Council, Committee on Diet and Health, Food and Nutrition Board, Commission on Life Sciences. *Diet and Health: Implications for Reducing Chronic Disease Risk*. Washington, DC: National Academy Press; 1989.
11. US Public Health Service. *Healthy People 2000: National Health Promotion and Disease Prevention Objectives*. Washington, DC: US Dept of Health and Human Services; 1991. DHHS publication PHS 91-50212.
12. Weinhouse S, Bal DG, Adamson R, et al. American Cancer Society guidelines on diet, nutrition, and cancer. *CA*. 1991;41:334–338.
13. Wynder EL, Berenson GS, Epstein FH, et al. Summary and recommendations of the conference on blood lipids in children: optimal levels for early prevention of coronary artery disease. *Prev Med*. 1983;12:728–740.
14. *Healthy Eating during the 'tween Years*. Chicago, Ill: American Dietetic Association; 1988.
15. Basch CE, Shea S, Zybert P. Food sources and dietary behavior patterns that determine Latino children's saturated fat intake. *Am J Public Health*. 1992;82:810–815.
16. Cresanta JL, Farris RP, Hyg MS, et al. Trends in fatty acid intakes of 10-year-old children, 1973 to 1982. *J Am Diet Assoc*. 1988;88: 178–184.
17. Thompson FE, Dennison BA. Dietary sources of fats and cholesterol in US children aged 2 through 5 years. *Am J Public Health*. 1994;84:799–806.
18. Putnam JJ, Allshouse JE. *Food Consumption, Prices, and Expenditures, 1968–1989*. Washington, DC: Commodity Economics Division, Economic Research Service, US Dept of Agriculture; 1991. Statistical bulletin 825.
19. US Dept of Agriculture. *Dairy Situation and Outlook Report and Yearbook*. Washington, DC: Commodity Economics Division, Economic Research Service; 1994.
20. New York State Dept of Agriculture and Markets. *Regional Sales Analysis of Packaged Fluid Milk Products in New York State*. Albany, NY: Division of Dairy Industry Services; 1993.
21. Bartholomew AM, Young EA, Martin HW, Hazuda HP. Food frequency intakes and sociodemographic factors of elderly Mexican-Americans and non-Hispanic whites. *J Am Diet Assoc*. 1990;90:1693–1696.
22. Delapa RM, Mayer JA, Candelaria J, et al. Food purchase patterns in a Latino community: Project Salsa. *J Nutr Educ*. 1990; 22:133–136.
23. Thompson FE, Sowers MF, Frongillo EA Jr, Parpia BJ. Sources of fiber and fat in diets of US women aged 19 to 50: implications for nutrition education and policy. *Am J Public Health*. 1992;82:695–702.
24. Winkleby MA, Albright CL, Howard-Pitney B, Lin J, Fortmann SP. Hispanic/White differences in dietary fat intake among low educated adults and children. *Prev Med*. 1994;23:465–473.
25. Wechsler H, Basch CE, Zybert P, Lantigua R, Shea S. The availability of low-fat milk in an inner-city Latino community: implications for nutrition education. *Am J Public Health*. 1995;85:1690–1692.
26. Shea S, Basch CE, Wechsler H, Lantigua R. The Washington Heights–Inwood Healthy Heart Program, a community-based cardiovascular disease prevention program in a disadvantaged urban setting: a six-year report and implications for public health policy. *Am J Public Health*. 1996;86:166–171.
27. Shea S, Basch CE, Lantigua R, Wechsler H. The Washington Heights–Inwood Healthy Heart Program: a third generation community-based cardiovascular disease prevention program in a disadvantaged urban setting. *Prev Med*. 1992;21:203–217.
28. Green LW, Kreuter MW. *Health Promotion Planning: An Educational and Environmental Approach*. Mountain View, Calif: Mayfield; 1991.
29. Kotler P, Roberto EL. *Social Marketing: Strategies for Changing Public Behavior*. New York, NY: Free Press; 1989.
30. Willett W. Challenges for public health nutrition in the 1990s. *Am J Public Health*. 1990;80:1295–1297.
31. Guthrie HA. Effect of a flavored milk option in a school lunch program. *J Am Diet Assoc*. 1977;71:35–40.
32. Natow AB. Chocolate milk and kids. *Sch Food Serv J*. 1992;46:38–40.
33. Norusis MJ. *SPSS/PC+ V. 4.0 for the IBM PC/XT/AT and PS/2. Base Manual*. Chicago, Ill: SPSS; 1990.
34. Martilotta M, Guthrie HA. Impact of providing milk options and nutrient information in school lunch programs. *J Am Diet Assoc*. 1980;77:439–443.
35. Hackett AF, Jarvis SN, Matthews JNS. A study of the eating habits of 11- and 12-year-old children before and one year after the start of a healthy eating campaign in Northumberland. *J Hum Nutr*. 1990;3:323–332.
36. Bell CG, Lamb MW. Nutrition education and dietary behavior of fifth graders. *J Nutr Educ*. 1973;5:196–199.
37. Stephenson LS, Latham MC, Jones DV. Milk consumption by black and white pupils in two primary schools. *J Am Diet Assoc*. 1977;71: 258–262.

38. Jansen JG, Harper JM. Consumption and plate waste of menu items served in the National School Lunch Program. *J Am Diet Assoc.* 1978;73:395–400.
39. New York City Board of Education. *School Lunch Survey: Plate Waste, Food Preferences and Participation.* New York, NY: Office of the Deputy Chancellor, Project Management Unit; 1978.
40. Stallings SF, McKibben GD. Validation of plate waste visual assessment technique in selected elementary schools. *Sch Food Serv Res Rev.* 1982;6:9–13.
41. Garey JG, Chan MM, Parlia SR. Effect of fat content and chocolate flavoring of milk on meal consumption and acceptability by children. *J Am Diet Assoc.* 1990;90:719–721.
42. Burghardt JA, Gordon AR, Fraker TM. Meals offered in the National School Lunch Program and the School Breakfast Program. *Am J Clin Nutr.* 1995;61(suppl 1):187S–198S.